Physics 126 Spring 2020

https://canvas.rice.edu/

Welcome to your second semester of physics!

We are about to begin our second term studying what one could say is *the fundamental science*. It has served as a model and inspiration for the development of many other branches of human endeavor. The journey of scientific discovery began at the dawn of civilization and has taken us to amazing places.

At the end of this semester you will have a basic but firm knowledge of the laws of Electricity and Magnetism, which will allow you to understand the behavior of a great number of physical systems. Even more important than this, if you are successful you will have developed *an attitude of thought and a way of thinking* that will serve you in many fields of inquiry.

In this class we will be sharing with you some of the insights (accumulated mostly over the last four centuries) about the way nature works and how we describe it. Just as important, we would also like to share with you the sense of wonder that nature inspires in us. We hope you will enjoy it!

Faculty

Jared Stenson
OFFICE HOURS: M 1:30-3:30 PM
CONTACT: 241 Brockman Hall
stenson@rice.edu
(713) 348-5727
For 1-on-1 meetings, by appointment:
M 11-12, T 2-3, Th 11-12, 2-3

Jason Hafner
OFFICE HOURS: MW 8-9:30 AM
CONTACT: 262 Brockman Hall
hafner@rice.edu
(713) 348-3205

Stan Dodds (Labs)
OFFICE HOURS: TBA
CONTACT: 215 Herzstein Hall
dodds@rice.edu
(713) 348-2510

Guido Pagano
HELP SESSION: T 2:30-4:30 PM
223 Herman Brown Hall
CONTACT: 302 Brockman Hall
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Course Objectives and Learning Outcomes

Students that successfully complete this course will:

- Have a basic but firm knowledge of Optics and Waves, the laws of Electricity and Magnetism, and Modern Physics which will allow them to understand the behavior of a great number of physical systems and phenomena such as light, optics, and circuits.
- Appreciate a scientific approach to learning and problem solving.
- Develop an aptitude for quantitative, qualitative, critical, and symbolic reasoning.
- Be able to effectively communicate technical ideas to others.
- Have hands-on experience in collecting and evaluating data using simple equipment in a laboratory setting.

1 Venues and Activities

1.1 Class

LOCATION: Herzstein Amphitheater
Tu, Th 9:25 AM – 10:40 AM

The class is large. Despite this, you must get involved and make it as interactive as possible. The goal of class time is to present the most important material in a clear and consistent way, and to identify the most common conceptual difficulties and stumbling blocks in the material. Your participation in class is encouraged and appreciated *and your engagement outside of class is necessary.* It is your responsibility to prepare yourself for class so that you can obtain maximum benefit from lecture. The format of the class will be a combination of lecturing, conceptual questions, demonstrations, and problem solving. Please notice that we will use class time only to go over the most difficult concepts in each chapter. *We will **not** cover all the basic material that you need to know to succeed in the class.* You will have to do this by studying the textbook outside of class and doing the homework. These are essential parts of the course.

ONLINE SECTION

This year we have created an online section for PHYS126. Students in the online section do not have an assigned lecture time to attend. Instead those students will watch lecture recorded in Spring 2019. The videos and images of the lecture notes are found in the Modules tab on the class Canvas page. The online students will do the some homework, lab sessions, pledge problems, and exams as the normal section.

Note that all PHYS126 students are to use the same Canvas page and have assess to the online lectures.

1.2 Homework Help Session

LOCATION: Pagano: Herman Brown Hall 223
T 2:30 PM – 4:30 PM

Help sessions are designed to help you understand the material necessary to solve the problems in the homework. Attendance to help sessions is not mandatory. However, they are an excellent environment to meet with other students working on similar problems. Dr. Pagano will be present at the help sessions but he is NOT there to do the problems for you but only to instruct, give guidance, clarify related concepts, and answer questions.

1.3 Laboratory

LOCATION: Herzstein 218 and 220

The laboratory portion meets 8 times over the course of the semester. You should submit your preference form **no later than 5:00 PM on Thursday Jan. 16th, to Stan Dodds in HRZ 215**. The form will be given to you on the first day of class and may also be found in the labs portion of the class website (Canvas). Your lab meeting time will be posted outside HRZ 215 by 5:00 PM on Friday Jan. 17th, after compiling student preferences.

Though your lab instructor will make clear and specific expectations for the laboratory portion of the course, *you are expected to prepare for the labs in advance* (including the first lab) by reading over the material.

1.4 Office Hours

Office hours are an excellent resource for you, the student. They will be held in the respective faculty offices. Other times may be scheduled by appointment via email. Please realize that office hours are important for us as instructors as well. While you get help on the class, we get feedback on how students are coping with the material. Therefore, we expect to see you there!

2 Nuts and Bolts

2.1 Materials

TEXTBOOK: Knight, Randall D., "Physics for Scientists and Engineers: A Strategic Approach with Modern Physics" 4th edition, Pearson Publishing (ISBN: 9780133942651). The campus bookstore has several purchasing options, including online digital rental. You may use previous editions of the Knight text but you will be responsible for navigating any differences.

CALCULATOR: Any scientific calculator with logarithms and trigonometric functions will do.

WEB ACCESS: On-campus access to the internet shouldn't be a problem for Rice students. We will use two Canvas as the main course website: https://canvas.rice.edu/. We'll use Canvas to post course information, updates, announcements, and resources. *Students are required to check it regularly*.

2.2 Your Grade

Your success in this course will depend on many factors. Some of them are beyond your control, like your previous experience with math and physics. However, many other factors – *even more important factors*–are entirely up to you. These include your focus, determination, attitude, and most importantly, the *quality* of the effort you spend working on the course. *A good attitude with hard **and** smart work will make the most significant difference in your grade*.

Grade Breakdown	
Laboratory	15%
Online Homework	10%
Pledge Problems	5x2%=10%
Exam I	20%
Exam II	20%
Final Exam	25%

Grade Cut Offs (tentative)	
87%	A-
77%	B-
67%	C-
57%	D-

These are the minimum grades that you are guaranteed when your grade is greater than or equal to the cut off listed.

2.2.1 Laboratory (15%)

The laboratory portion of the course is both significant and important. The objective is to gain appreciation for the empirical nature of physical science and to gain experience in testing its relationships. Your grade will be determined by Prof. Stan Dodds and your individual lab instructor. Please refer any questions you might have about the labs to them.

2.2.2 Regular Homework (10%)

Your homework grade will be based on weekly homework assignments posted on the Canvas course page. Each week there will be a set of 15-20 problems to complete. These assignments will be due on Wednesday evenings.

To provide students with additional resources to help them prepare for the exams we plan on listing additional Suggested Problems (for practice) from the textbook and/or practice exams on the course webpage. Please note that *even though the solution to these problems may be available, students are strongly encouraged to look at the solutions only as a last resort*. Every minute you spend genuinely exploring a problem adds to your understanding of the material.

2.2.3 Pledge Problems (10%)

Roughly 5 times during the semester students will be assigned a more extensive, take-home problem which they "pledge" to work on *individually*. If approached correctly this will not only give students experience working a problem in more depth but will prepare them for the exams. These will be graded for correctness **and** on the quality of the work.

The act of submitting these problems will be taken as your pledge that all work contained therein is your own and was completed according to Rice's standards of academic integrity.

2.2.4 Exams I & II (20% each)

We will have a total of two midterm exams on the day and time specified on the schedule on the last page of this syllabus. *Please make sure that you make arrangements, travel and otherwise, so that you can take the exams at the scheduled times. Only documented medical emergencies and official conflicting university-endorsed activities will be considered as exceptions.* Each midterm exam will test you only on the chapters covered since the previous exam though you will be benefited if you recognize that physics is necessarily a subject that builds later results off of earlier insights. In general, all exams (including the final exam) will have a combination of conceptual short-answer questions (such as multiple choice, etc.) and free-response multiple-part problems (like pledge problems).

2.2.5 Final Exam (25%)

The final exam will be given during the regularly scheduled week for final exams at Rice. ***You are required to take the final at the time and place specified by Rice University.*** **Do not make travel arrangements before the last day of final exams (Apr 29-May 6).**

The final exam may be comprehensive. That is, it will be similar in format to the midterms and will focus on material from the last third of the semester but *may have questions that specifically focus on material that was already covered on previous exams*. To reflect this, the final exam is more heavily weighted than are the midterms. This means *it is more important to finish strong than it is to start*

fast. Early on in the semester, *building a lasting conceptual foundation is vastly more important than merely "finishing assignments."*

2.3 Policies

2.3.1 The Honor Code

We expect you to uphold the ideals set out by the honor council for Rice University students. More information can be found at http://honor.rice.edu/.

2.3.2 Lectures

If laptops are open they should be used for class-related activities to promote learning (i.e. facebook, recreational videos, work from other classes, etc. are not class-related activities). Be polite and considerate with your instructors and your fellow classmates. If you are late or need to leave early, please enter and leave the room as quietly as possible.

2.3.3 Homework

You are advised to work on your homework *individually* for *as long as you are making progress*. Discussing, articulating, and learning from your peers is very useful and important but *it must remain constructive* (reasoning-centered and independent rather than answer-centered and conforming). If you need help from others you may collaborate but *do not confuse this with the important task of making progress on your own.* Working *wisely* on these problems is an essential part of your training and it will improve your performance on the exams. You are wasting your time when you have somebody else solve a problem for you in the same way that an athlete is wasting his or her time letting his/her teammate workout for them.

In Canvas you may find Suggested Problems/practice exams and study helps to help you prepare for the exams. Please note that, as said before, *the only problems that benefit you are the ones you make your own by investing individual effort.* Be aware that *memorizing solutions to different kinds of problems is a notorious waste of time!*

2.3.4 Exams

Exams must be completed within the allotted time and with no outside assistance. Instructors will periodically be in the exam room. The *instructors can clarify typos but will not provide any information that would give you an unfair advantage over your classmates.* This includes pertinent definitions, units, or interpretations that you are expected to know. There should be no communication with any other persons (verbal, electronic, etc.). The use of calculators on the exam is permitted, but no other electronic devices. You will

also include a signed copy of the honor pledge on your exams: “On my honor, I have neither given nor received any unauthorized aid on this exam nor have I observed any improper behavior in other students.”

Please note that you will have one week *after an exam’s grade is posted in Canvas* (not after the solutions are posted) to report any problems with the grading or the recording of the grade of your exam. To ask for a re-grade, attach to your exam a specific written explanation of the problem and return it to Dr. Stenson. Please note that *the whole exam will be reviewed, not just the problem in question*. If there is a clear error we will make any necessary corrections. Clearly, since we re-grade the entire exam, *the assigned grade can increase, decrease, or stay the same.* In making this decision you should realize that minor disagreements over a grader’s best judgment tend to average out over the course of an entire exam. *The re-grade process is intended for clear errors or oversights on the graders part*. Students will not have access to the grading rubrics.

2.3.5 Late Policy

As a general policy, *no late exams will be permitted.* Exceptions to this rule and opportunities for make-up are *rare* and are limited to *documented medical emergencies and official conflicting university-sponsored activities.* Exceptions will be considered on a case-by-case basis. Generally homework will receive a 25% point deduction per day late up to a maximum 75% late deduction. Other late assignments will be automatically reduced by 50%. Laboratory policies will be set up by Prof. Dodds and your lab instructor. It is advantageous to the student to discuss these situations with the instructor in person *and* by email *in advance.* If the nature of the circumstance prevents advance notice, it is in the student’s best interest to discuss the situation with the instructor *as soon as possible.*

2.3.6 Students with Disabilities

Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with Dr. Hafner during the first two weeks of class. All such discussion will remain completely confidential. Any documentation must come directly from Disability Support Services in Allen Center.

2.3.7 Standard Disclaimers

The instructor has authority to rule on any point not covered in this syllabus.

The syllabus is subject to change at the discretion of the instructor. Students will be notified ahead of time before any changes take effect.

Schedule for Physics 126 Spring 2020 (tentative)

Week	Topics	Chs.	Laboratory
1/13	Standing Waves	17	
1/20	Interference, Wave Optics	33	Standing Waves
1/27	Wave Optics, Ray Optics	34	Diffraction & Interference
2/3	Ray Optics^		Lenses & Images
2/10	Eye and Color, **MIDTERM RECESS**	35	
2/17	Electric Charge & Forces^	22, 23	
2/21	**EXAM I, 7-9 PM**		
2/24	Electric Fields, Electric Potential	25, 26	Electrostatic Phenomena
3/2	Current & Resistance	27	E-Field Mapping
3/9	Circuits^	28	
3/16	**SPRING BREAK**		
3/23	Magnetism	29	Circuits & Resistivity
3/27	**EXAM II, 7-9 PM**		
3/30	Magnetism, Induction	30	
4/6	Induction		
4/13	Modern Physics, Nuclear Physics^	38, 42	Atomic Spectra
4/20	Review		E&M Induction
4/29-5/6	Final Exam, TBA^		

^ tentative due dates for Pledge Problems